reaction and said each of said DNA probes has phosphorothioate bonds.

REMARKS

Applicants have canceled claims 33-35 and 42-44 without prejudice or disclaimer. Accordingly, claims 30-32, 36-41 and 45-48 remain pending.

Claims 30, 31, 36, 37, 39, 40 and 45-48 have been amended to overcome the outstanding 35 U.S.C. § 112, second paragraph and 35 U.S.C. § 101 rejections.

In particular, Applicants have amended claims 30, 36, 39, 45 and 47 to include the structural relationships between the claimed elements. With respect to claims 30 and 36, the claimed polynucleotide assay apparatus is supported by Figs. 10 and 11 of the present application. The description of Fig. 10 begins on page 25 and the description of Fig. 11 begins on page 29 of the specification, which describes a polynucleotide detecting cell 41, a voltage applying unit 44 and an optical detector 42. Claims 30 and 36 have been amended to include the relationship between these elements in compliance with 35 U.S.C. § 112, second paragraph.

With respect to claim 39, the electrode selectors that are claimed are supported in the specification by the

description of Fig. 12, which begins on page 31 of the specification. The working electrode 60, shown in Fig. 12, is kept at ground potential, while the voltage from the voltage applying unit 44 can be separately applied to the counter electrodes 62-1, 62-2 and 62-3 by appropriate selection of the corresponding switches 62-1s, 62-2s and 62-3s. Further, a controller 45 shown in Figs. 10 and 12 is used to control the application of the voltage applied by the voltage applying unit or power source 44. Accordingly, claims 39-41 comply with 35 U.S.C. § 112, second paragraph.

Claims 45 and 46 are supported in the specification by the description of the invention set forth with respect to Fig. 10. Claim 45 includes a TV camera, represented by block 43 in Fig. 10, and an optical system 42 which optically connects the detecting cell and the pickup elements of the TV camera. Although Applicants have amended claim 45 to include the connection between the power source and the TV camera, as well as the power source controller, the claim does not require further amendment with respect to the connection of the optical system. Accordingly, claim 45, as amended, complies with 35 U.S.C. § 112, second paragraph.

Claim 47 is supported by the description of Fig. 19, which begins on page 43 of the specification. Claim 47

includes a controller that controls application of the voltage by the power source and reading of signals accumulated in the CCD camera. Fig. 19 shows controller 248 which supports this claim limitation (see page 44, lines 11-13 of the specification, for example). Accordingly, claims 47 and 48 comply with 35 U.S.C. § 112, second paragraph.

Applicants have amended all of the independent claims to comply with the Examiner's indefiniteness rejection with respect to the claims not setting forth any steps involved in a method/process and the rejection under 35 U.S.C. § 101. However, the claims are directed to a polynucleotide assay apparatus, not a method/process, in general, and therefore reconsideration of these rejections is requested.

With respect to the objection to the phrase "equal measure" and "ECL label labels", these phrases have been deleted from the claims to overcome the rejection. Further, Applicants have included the term "nucleotide" in conjunction with the use of the term "base", as suggested by the Examiner.

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In view of the foregoing amendments and remarks, reconsideration and reexamination are respectfully requested.

Respectfully submitted,

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MARKED UP VERSION OF REWRITTEN CLAIMS

30. (Amended) A polynucleotide assay apparatus comprising:

a polynucleotide detecting cell provided with a first plate whereon a first electrode is formed and a second plate whereon a second electrode is formed, wherein the surface of said first electrode is divided into plurality of areas, to each of which DNA probes having a different nucleotide base sequence are fixed, said second electrode is arranged opposite to said first electrode with a predetermined distance, said second plate consists of a light-transmissive material, and said second electrode is transparent [and has an equal measure to said first electrode];

a voltage applying unit connected to said polynucleotide cell for applying a voltage between said first electrode and said second electrode; and

an optical detector adjacent said polynucleotide cell for detecting an electrochemiluminescence (ECL) generated from an ECL label resulting from the application of said voltage, to detect target polynucleotides which are trapped by hybridization between said DNA probes fixed to said areas and said target polynucleotides,

wherein at least one species of base labeled with said ECL label is [used in an extending reaction]applied to extend said hybridized DNA probes[, or said ECL label labels said target polynucleotides, or said ECL label labels an oligonucleotide coupled to said target polynucleotides].

31. (Amended) A polynucleotide assay apparatus according to claim 30, wherein at least the one species of base labeled with said ECL label is [used]applied in [said] an extending reaction and said each of said DNA probes has phosphorothioate bonds.

36. (Amended) A polynucleotide assay apparatus comprising:

a polynucleotide detecting cell provided with a base plate whereon a first comb-shaped electrode and a second comb-shaped electrode are formed, wherein the surface of said first comb-shaped electrode is divided into plurality of areas [each having equal measure], DNA probes having a different nucleotide base sequence are fixed to each of said areas, teeth of first comb-shaped electrode and teeth of second comb-shaped electrode are arranged in alternate repetition in parallel [at equal intervals in one direction];

a voltage applying unit connected to said polynucleotide cell for applying a voltage between said first

comb-shaped electrode and said second comb-shaped electrode; and

an optical detector adjacent said polynucleotide cell for detecting an electrochemiluminscence (ECL) generated from an ECL label resulting from the application of said voltage; to detect target polynucleotides which are trapped by hybridization between said DNA probes fixed to said areas and said target polynucleotides,

wherein at least one species of base labeled with said ECL label is [used in an extending reaction] applied to extend said hybridized DNA probes [, or said ECL label labels said target polynucleotides, or said ECL label labels an oligonucleotide coupled to said target polynucleotides].

37. (Amended) A polynucleotide assay apparatus according to claim 36, wherein at least the one species of base labeled with said ECL label is [used] applied in [said] an extending reaction and said each of said DNA probes has phosporothioate bonds.

39. (Amended) A polynucleotide assay apparatus comprising:

a polynucleotide detecting cell provided with a base plate whereon a first comb-shaped electrode and a plurality of second electrodes are formed, wherein the surface of said

first comb-shaped electrode is divided into plurality of areas [each having equal measure], DNA probes having a different nucleotide base sequence are fixed to each of said areas, each of said second electrodes is separated from said first comb-shaped electrode and is arranged between [two] teeth of said first comb-shaped electrode, and said first comb-shaped electrode and said second electrodes are arranged in alternate repetition in parallel at equal intervals in one direction;

a voltage applying unit connected to said polynucleotide cell;

electrode selectors connected between said polynucleotide cell and said voltage applying unit for selecting an electrode out of said second electrodes;

[a] said voltage applying unit [for] applying a voltage between said first comb-shaped electrode and said selected second electrode;

an optical detector adjacent said polynucleotide cell for detecting an electrochemiluminescence (ECL) generated from an ECL label resulting from the application of said voltage, to detect target polynucleotides which are trapped by hybridization between said DNA probes fixed to said areas and said target polynucleotides, and

a device connected to said voltage applying unit for controlling the duration of the application of said voltage on the basis of the velocity of the expansion of a region in which said ECL occurs and the distance between the center line of each of teeth of said first comb-shaped electrode arranged in alternate repetition in said one direction and the center line of each of said second electrodes in said one direction,

wherein at least one species of base labeled with said ECL label is [used in an extending reaction] applied to extend said hybridized DNA probes[, or said ECL label labels said target polynucleotides, or said ECL label labels as oligonucleotide coupled to said target polynucleotides].

40. (Amended) A polynucleotide assay apparatus according to claim 39, wherein at least the one species of base labeled with said ECL label is [used] applied in [said] an extending reaction and said each of said DNA probes has phosphorothioate bonds.

45. (Amended) A polynucleotide assay apparatus comprising:

a polynucleotide detecting cell provided with a first plate whereon a first electrode is formed and a second plate whereon a second electrode is formed, wherein the surface of said first electrode is divided into plurality of

areas, to each of which DNA probes having a different nucleotide base sequence are fixed, said second electrode is arranged opposite to said first electrode with a predetermined distance, said second plate consists of a light-transmissive material, and said second electrode is transparent [and has an equal measure to said first electrode];

a power source connected to said polynucleotide cell which applies a voltage between said first electrode and said second electrode;

a power source controller connected to said power source which controls the duration application of said voltage;

a TV camera adjacent said polynucleotide cell having a plurality of pickup elements which detects, as a 2D image, an electrochemiluminescence (ECL) generated from an ECL [label labeling] labeled with a base which [extends] is applied to extend DNA probes hybridized with target polynucleotides by an extending reaction at said areas resulting from the application of said voltage, to detect the presence or absence of any extended chain generated by said extending reaction, for detecting said target polynucleotides which are trapped by hybridization between said DNA probes fixed to said areas and said target polynucleotides; and

an optical system which connects optically said polynucleotide detecting cell and said pickup elements.

46. (Amended) A polynucleotide assay apparatus according to claim 45, wherein at least one species of base labeled with said ECL label is [used] applied in [said] an extending reaction and said each of said DNA probes has phosphorothioate bonds.

47. (Amended) A polynucleotide assay apparatus comprising:

a polynucleotide detecting cell provided with a base plate whereon a first electrode and a plurality of second electrodes are formed, wherein the surface of said first electrode is divided into plurality of areas [each having equal measure], to each of which DNA probes having a different nucleotide base sequence are fixed, each of said second electrodes is separated from and surrounded by said first electrode, and arranged in a central part of each of said areas, and arranged at equal intervals in two directions;

a power source connected to said polynucleotide cell which applies a voltage between said first electrode and said second electrode;

a CCD camera adjacent said polynucleotide cell which detects, as a 2D image an electrochemiluminescence (ECL)

generated from an ECL [label labeling] labeled with a base which [extends] is applied to extend DNA probes hybridized with target polynucleotides by an extending reaction at said areas resulting from the application of said voltage, to detect the presence or absence of any extended chain generated by said extending reaction, for detecting said target polynucleotides which are trapped by hybridization between said DNA probes fixed to said areas and said target polynucleotides; and

a controller connected to said power source and said CCD camera which controls application of said voltage by said power source and reading of signals accumulated in said CCD camera.

48. (Amended) A polynucleotide assay apparatus according to claim 47, wherein at least one species of base labeled with said ECL label is [used] applied in [said] an extending reaction and said each of said DNA probes has phosphorothioate bonds.